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AUTHOR Brown, Kristi; And Others
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ABSTRACT

This booklet offers information regarding adaptive equipment for positioning and mobility of children with disabilities from birth to age three, with reproducible pages discussing and illustrating particular positioning systems. Types of equipment are organized by position, including equipment for prone, supine, side lying, seating, standing, mobility, and ambulation equipment. Also included are sections on specific skills facilitated by the adaptive equipment, recommendations for the equipment selection process, tips on purchasing equipment, and guidelines for making nine basic positioning devices. A bibliography of eight items and contact information for agencies dealing with positioning and mobility equipment conclude the guide. (PB)

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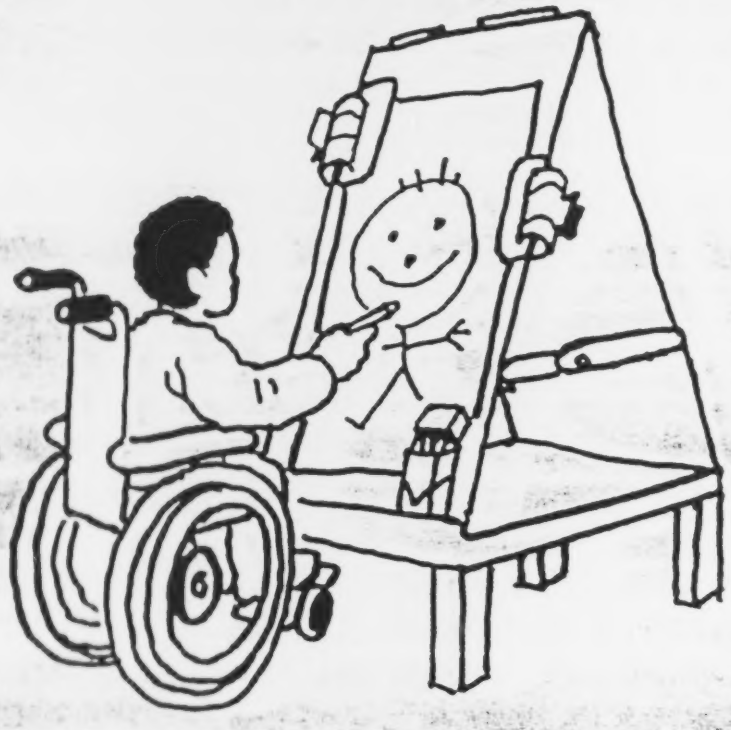
Adaptive Equipment for Positioning and Mobility:

Focus on Infants and Toddlers



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Produced By:
Augmentative Communication Therapy (ACT)

Illustrated By:
Jay Honeycutt

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Adaptive Equipment for Positioning and Mobility:

Focus on Infants and Toddlers

Written By:

Kristi Brown, PT
Coreen Bookout, PTA
Elizabeth Nowak, PT
Laura Fowler Lewis, M.S., CCC-SLP
Deborah Fitzgibbons, M.S., OTR/L

Augmentative Communication Therapy (ACT)
2301 Rexwoods Drive, Suite 108
Raleigh, North Carolina 27607
(919)781-4434

Illustrated By: **Jay Honeycutt**
(919)782-7469

November 1994

Developed in coordination with the NC Assistive Technology Project
1110 Navaho Drive, Suite 101 Raleigh, NC 27609 (919)850-2787

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Raleigh Pediatric Therapy

Lynn McCoy, OTR/L

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INTRODUCTION

Proper positioning is basic to the performance of many skills, especially for the child with motor problems. Without proper positioning children may be less likely to reach their potential for walking, communication, play, or self-help. Correct positioning reduces the energy the child uses to hold a position, and allows children to concentrate on other skills. When in a poor position, children may be unsure where their bodies are located in space, or feel unsafe in that position. Properly fitted positioning equipment helps children interact with their environment and be more independent in play, learning and self-care.

Positioning needs change as children grow, have new medical needs, and/or gains in skill development. Children need to be in several positions during the day. Different positions challenge or enable children to perform various skills. Proper positioning using adaptive equipment helps the child use more normal postures and movements to perform skills more easily. However, children need time out of their positioning equipment to move freely and to be held and cuddled.

When children are placed in any piece of equipment, it is strongly recommended that they are given a learning or play activity. By placing toys on a surface area in front of them, children will have an opportunity to interact and learn from the toys. While their bodies are optimally positioned, children may be more successful in practicing and performing certain skills: visual tracking, grasping, eye-hand coordination, playing with both hands, etc.

This booklet was designed, in cooperation with the NC Assistive Technology Project, to provide families, caregivers and professionals with information regarding adaptive equipment for positioning and mobility for birth to three year olds. A brief overview of many different types of equipment are included in this booklet. The pages discussing the particular types of equipment are reproducible, for the professional to share with parents. Also included are sections on the skills facilitated by the adaptive equipment, recommendations for the process in which equipment is selected, and process for purchasing equipment. The resource sections at the end of the booklet include "How-To" ideas for fabrication of simple positioning equipment, bibliography and suggested readings, and agencies dealing with positioning and mobility equipment.

Psychology of Adaptive Equipment ...

When a child with disabilities or delays is born, the family must learn to understand and accept the child's abilities and needs. The parents seek help from physicians, and speech, occupational and physical therapists. These specialists give the parents great amounts of new information, including activity ideas and recommendations for adaptive equipment.

Adaptive equipment may have both positive and negative meanings to the child, to the family, and to society. To the family, acceptance of the equipment may signify total acceptance of their child's disability. They might fear that accepting adaptive equipment means rejecting hope of future independence for their child.

The family may fear that seeing a child positioned in adaptive equipment may evoke certain feelings and attitudes (fear, pity) in relatives, friends and others. On the other hand, the equipment may also have a positive meaning for the family and child, understanding that it is helping the child both physically and functionally. Through education and the positive attitude of the family, others' attitudes can be changed. Parent support groups are helpful in sorting out these emotions as adaptive equipment enters the family's and child's lives.

Children vary in their acceptance of adaptive equipment due to age, cognition, and comfort. Some children readily tolerate and accept the equipment. They realize that they are better able to see what is going on around them, are able to breathe or eat more easily, or use their hands better. For children who are resistant to equipment, behavior management techniques can be used to increase their tolerance.

Other children may see positioning equipment as a form of punishment. Up to this point the children have had close proximity to their caregivers, often being held for most of their waking hours. The children may also feel "restrained", as the equipment does not allow their typical movements. Play activities and personal attention can increase a child's responsiveness to equipment.

It is important that children do not spend all day in positioning equipment. The drawback of positioning equipment is that it separates children from the touch of their parents, caregivers and friends. Children still need to feel loved through touch, holding hands, getting and giving hugs, and cuddling. This close contact contributes to the children's development of a positive self-concept.

Hopefully this booklet will inform parents and careproviders about the benefits of adaptive equipment for positioning and mobility, and help develop positive feelings and attitudes!

Need for Adaptive Equipment for Positioning and Mobility

Skeletal Alignment and Gross Motor Skills

Many children with motor impairments have abnormal reflexes or reactions which affect their ability to move their arms, legs, and body. The tone of the child's muscles may be be abnormally high, causing movements to be stiff or jerky, or low, causing the child to look weak or "floppy". The child may have difficulty moving against gravity and balancing, which make it difficult to get or stay upright. These greatly limit children's abilities to interact with their environment and to move independently. Positioning children with poor motor control helps them meet their maximum potential. Adaptive equipment can stabilize children in prone, supine, sidelying, sitting, and standing positions. Children can then experience how their bodies feel and learn to move better in these positions. Proper positioning impacts children's further motor development in rolling, sitting, crawling, kneeling and walking.

Most children with abnormal muscle control are at risk for developing bone deformities such as scoliosis (spinal curvature) or hip dislocation/subluxation (out of joint). Normal postures and movements are more difficult when bones and joints are deformed or not properly aligned. These skeletal deformities can also lead to difficulty in breathing and speaking. Positioning equipment, when used properly, can help to eliminate or delay many of these skeletal problems.

Positioning equipment can help to lessen high muscle tone or spasticity. This makes it easier for children to move on their own, such as to lift or turn their head or to move an arm or leg. For children with low tone, equipment can stabilize the trunk and head so that they can use their arms, legs, and neck .

Using a variety of devices allows the child's position and the amount of support to be varied. Standing equipment and other equipment that allow an amount of weightbearing through a joint or body part encourages the child to use the muscles of that body part. For example, weightbearing through the legs contributes to standing, walking, and crawling. Weightbearing through the arms increases ability to reach. Positioning equipment enables children to be more active, and therefore gain more control. As the children gain more active muscle control, the amount of support should be decreased so they can continue to gain higher level gross motor skills. Equipment for mobility is designed so that it encourages the child's best posture when moving about.

Vision, Fine Motor and Feeding Skills

Children with decreased motor control learn about the world primarily through hearing and seeing people and objects. Positioning in adaptive equipment, with proper trunk and head supports, allows them to see more of their surroundings. When choosing positioning equipment, consider how the child is best able to have eye contact with peers and adults. This develops skills in visual focusing and tracking.

For children with visual field cuts, *do not* position them to maintain their head in midline, as this may significantly decrease what they can see. These children will need to position their heads to compensate for poor eye movement or visual fields and to allow maximum vision.

Using equipment to support or stabilize the trunk and legs gives children better control of their arm and hand movements. A tray or table surface allows children to purposefully interact with switches, toys, or even to feed themselves independently. Adjust the tray or table to a height that maximizes hand use. Generally, it is best to have the tray positioned one to two inches above elbow height. Various positions help encourage hands to midline, hands to mouth, bilateral hand use, and crossing midline. Blocks on trays can be used to maintain children's hands within their sight and in a functional position. Improved hand use increases children's learning through exploration and manipulation of objects.

Many children with motor problems have difficulty with feeding. Providing proper alignment of the head, neck and trunk allows children's oral muscles to work efficiently. For children with abnormal muscle tone, poor positioning may result in any of the following: poor lip closure, a weak or uncoordinated suck/swallow pattern, aspiration, poor chewing, tongue thrust, and lack of controlled jaw movements for drinking and/or eating. Proper support with a positioning device gives children increased control of lips, tongue, swallow mechanism, and jaw.

Communication and Breathing Skills

Proper positioning helps children with special needs communicate through speech or some form of nonverbal communication. For either type of communication, it is beneficial for children to be able to maintain eye contact with the listener. For speech, children must have adequate breath support for voice output. Proper trunk support allows the rib cage to expand better for breathing.

Children who are unable to use speech as their main way to communicate usually rely on their hands, feet, head or other body parts to express themselves. Proper positioning may free arms and hands for gesturing, pointing, performing sign language, or using an augmentative communication device.

Children who use augmentative communication activate the device through direct selection of symbols or objects, or through a switch (i.e. loop tapes, scanning devices). Direct selection can be done by touching the symbols with a hand or dowel, pointing a light on the symbol, or by touching the symbol with a headstick, chinpointer or other adapted devices. Proper positioning increases control of head, hands, etc. for accessing such devices.

Switches are activated through touch (hand, foot, head, etc.), eye blinks, muscle movements, or sips and puffs of air. When children require these more sophisticated means of communication, positioning is even more vital.

Selecting the Equipment

The Team Approach

It is very important for the whole team to be involved in the decision making process when it comes to choosing a piece of adaptive equipment. Each member of the team has a unique perspective of the child that will help in choosing the most appropriate piece of equipment with the necessary adaptions. The "team" may include: the child, family, physician, therapists (physical therapist, occupational therapist, and speech-language pathologist), medical equipment suppliers and educators or other interventionists.

Functional Needs Assessment

The completion of a "functional needs assessment" is crucial to acquiring the most functional and appropriate pieces of equipment for the child. Selection of equipment should be appropriate not only in terms of the best anatomical alignment for the child, but should also take into account the child's function. Good equipment selection will allow the child functional communication and participation in his/her every day environments - home, school, and community. Equipment must also be taken into consideration for transporting the child between these environments.

The team involved in recommending and obtaining the necessary equipment should complete a thorough needs assessment by interviewing the child's family members, caregivers, classroom staff and others that interact with the child on a daily basis. Members of the team should also make on-site observations, if possible, of all the environments in which the child participates. The assessment should cover all positions in which the child needs to be placed during the day (i.e., sitting at a table, playing on the floor with peers, etc.) and what activities the child will be involved in while in these positions.

When deciding on equipment for the child's mobility, the child's strength, endurance and distance within and between environments needs to be assessed. Energy expenditure must be taken into account also (i.e., if the child walks with a walker from the car to the house, he may be too tired to feed himself lunch). Different mobility equipment may be needed for home/daycare use (walkers, crutches) and community use (wheelchair). Energy expenditure needs to be considered along with physical ability when considering manual versus powered mobility.

If the child already has an augmentative communication (AC) system, or the team realizes that this will be a consideration in the future, it is important to take this system into account when ordering positioning equipment. The AC system should be compatible with the mobility/positioning equipment so that it is easily accessible and transportable. If the child uses a power mobility system, the AC system should be easily operable through the power of the mobility system.

Trial Use of Recommended Equipment

Durable medical equipment is very expensive, and funding can be difficult to obtain. Therefore, it is important to work with a local vendor who specializes in pediatric equipment, or with a pediatric therapy practice which has equipment for evaluation and/or trial purposes. This trial use is helpful in determining whether the equipment being considered best meets the needs of the child, if the size is appropriate, or if there is a need for certain customized modifications which can be done to maximize the benefits of the equipment.

Consideration of Child's Muscle Tone

When selecting the proper piece of equipment with the therapist, it is important to keep in mind the amount of support the child will need from the equipment. Properly selected, the equipment will provide adequate support to substitute for the child's lack of motor control while providing him or her with adequate potential to be active in the chosen position. Too much control from the equipment limits the child's ability to move voluntarily. Not enough support from the equipment allows poor skeletal alignment, which will also limit the child's stability and movements.

The chart on the following page includes a brief description of the most common types of abnormal muscle tone, as well as goals to keep in mind when selecting positioning options.

	CHARACTERISTICS	GOALS OF POSITIONING
HIGH TONE (spasticity)	- varying degrees of spasticity (minimal to severe) - usually dominated by abnormal reflexes - tone increases with effort, speech and occasionally position - at risk for skeletal deformity and loss of range of motion	- normalize tone - facilitate active movement - provide alignment and inhibit tone for active movement - prevent skeletal deformity and loss of range of motion
ATHETOID (fluctuating tone)	- unable to stabilize body - constant movement - excessive movement on attempts to move - skeletal deformities not very common - poor use of head, eyes, and extremities due to constant movement - very active but poor quality	- provide stability - decrease excessive, non-directed movement - allow for more normal movement/motor control with proper stability
LOW TONE (hypotonic)	- low muscle tone (flaccid/"floppy") - very little active movement - body parts fall into gravity - at risk for skeletal deformities due to effects of gravity and poor muscle tone to hold a position	- proper positioning and support to try to facilitate increased active movement - provide support so the child can attempt to move - position to eliminate effects of gravity and allow gravity assisted movement - prevent skeletal deformities

PRONE

Positioning in Prone

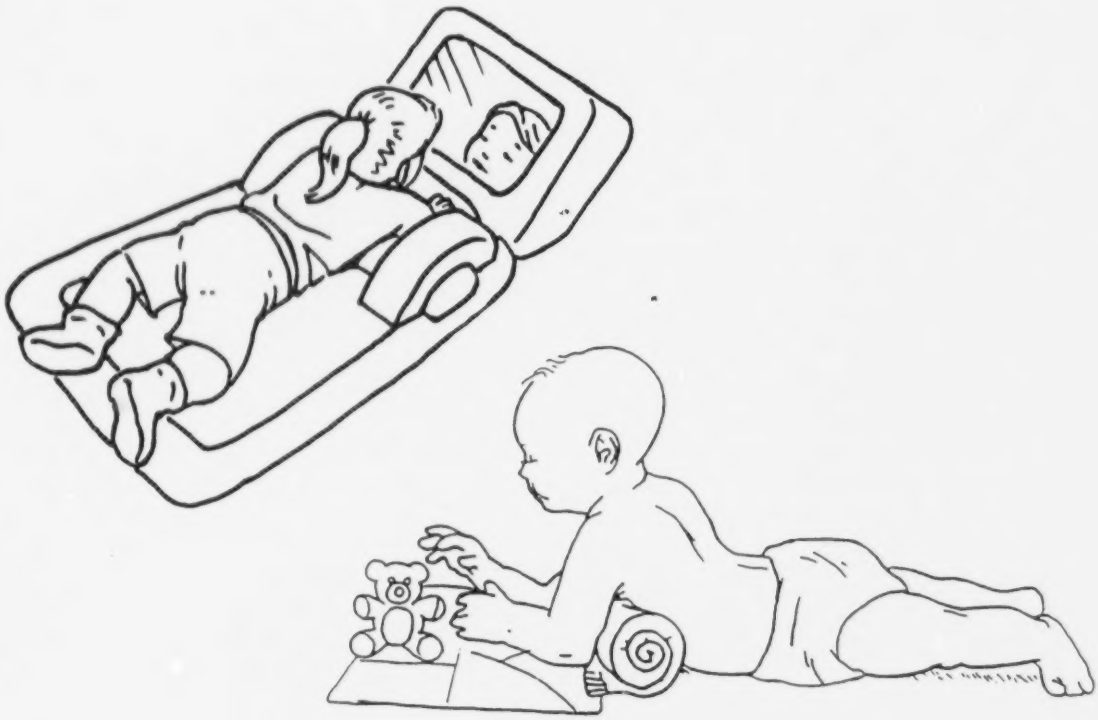
Purpose: Positioning children on their stomachs leads to natural weightbearing through the shoulder girdle and hips. This weightbearing leads to strengthening of both of these areas; development of hip and shoulder girdle strength is a prerequisite to rolling and crawling. Positioning the child in prone gives the child early opportunities for practicing neck and trunk extension, and head control against gravity. This position is especially beneficial to lessen flexion synergy patterns, and for children with low tone.

Goal: Proper alignment of the child so that they weightbear equally through both forearms and hips. Stimulate development of head and trunk extension - an important component in the development of head and trunk control.

Summary: Prone position allows for early development of strength and control at the shoulders and hips. It also stimulates the development of the components necessary for head and trunk control.

Options for Prone Positioning:

Towel Rolls and Bolsters
Wedges
Scooterboards

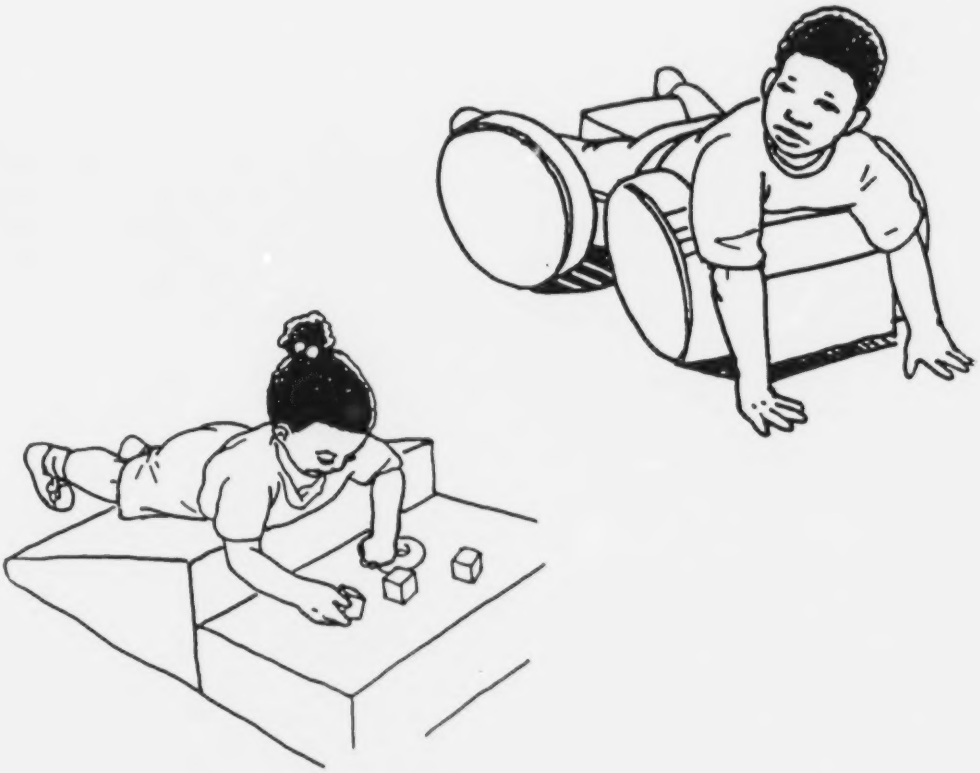


TOWEL ROLLS AND BOLSTERS

Function: Used to assist the child with propping on their forearms for important weightbearing through the shoulders. Towel rolls and bolsters help keep the child's arms positioned with elbows lined up under the shoulders. Towel rolls and bolsters are used under the child's chest to provide support of their body weight so total weight will not need to be supported by the child.

General Considerations: Used when a child does not have the strength or control through their shoulders to maintain a forearm prop position independently. Also used to facilitate head control in a tummy position. Roll or bolster needs to be small enough so that the child's forearms and elbows are still able to weightbear on a support surface.

Adaptations: Towel rolls may need to be rolled tightly and taped together to provide a firm surface for support. Half bolster rolls are available to provide a firm surface for weightbearing.

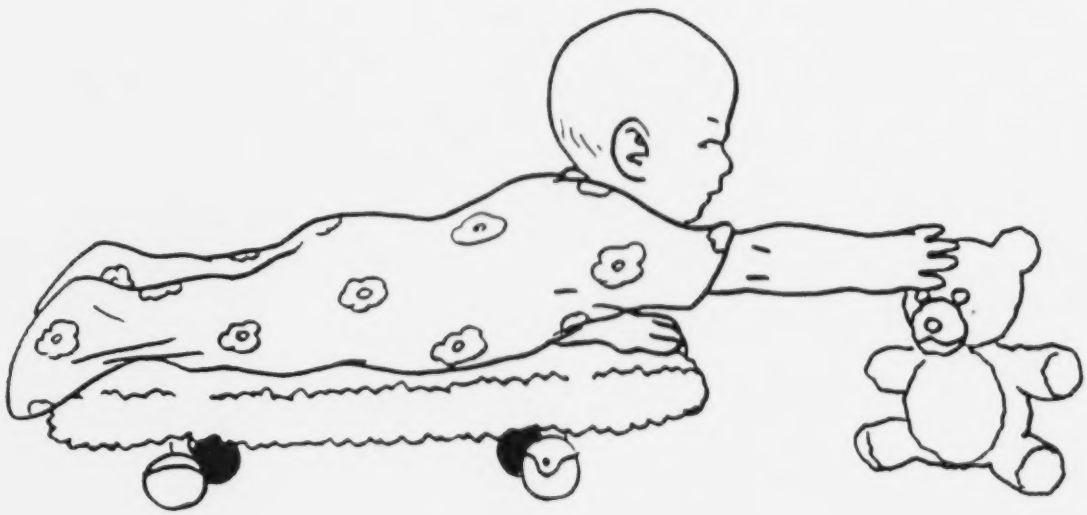


WEDGES

Function: A small incline which assists in bringing the child's center of gravity back towards his or her hips to make the effects of gravity less and to assist the child in lifting his or her head and pushing up on his or her arms.

General Considerations: Usually used with children who have mild involvement. Some wedges have straps, to prevent the child from leaning over or falling off. When prone on the wedge, there is equal weightbearing in between the child's shoulders and hips. Also promotes alignment of trunk and shoulders for weightbearing.

Adaptations: Velcro straps across pelvis to keep hips down and to provide stability. Pie shaped wedges to velcro on the wedge to keep child from sliding down or falling off, and to keep arms forward for weightbearing.



SCOOTERBOARDS

Function: Provides a firm surface combined with mobility in the prone position. Using arms forward to propel self on scooter boards, facilitates trunk extensor and neck extensor control and strength.

General Considerations: Give child use of easy floor surface (not carpet) for success with mobility. Give child a goal for mobility (i.e. to go towards a person, to get to an auditory toy, etc.).

Adaptations: Straps used on chest and hips to provide stability and safety while on scooter board.

SUPINE

Positioning in Supine

The supine position (lying on the back) is not an optimal position for children with motor problems who have difficulty moving against gravity. It is a position that encourages primitive reflexes and asymmetrical posturing. Supine is the position in which the child has to fight against gravity the most in order to maintain the head in midline and to bring hands to midline for play. Lastly, this position offers little interaction with the environment or peers beyond when the child is a few months of age. There are several alternatives to positioning the child flat on his/her back.

When a child is placed in any piece of equipment it is strongly recommended that an activity to promote learning (tracking, eye-hand coordination, midline orientation, etc.) be provided. A toy frame with suspended toys provides the child with a learning or play activity while in supine.

Purpose: Wedges, nests and supine lyers are pieces of equipment that can be used as alternatives for supine positioning. Each piece provides more support, inclines the child just enough to inhibit abnormal reflexes, and allows for volitional movement without the full effects of gravity.

Goal: To provide a supporting surface for the child with symmetrical alignment throughout.

Summary: Promotes midline control and antigravity flexion of head and extremities.

Options for Supine Positioning:

Wedges
Nests and Bean Bag Chairs

WEDGES

Function: A small incline which lessens the impact of gravity on the child's abnormal posturing. By breaking up abnormal reflexes, wedges allow for midline orientation of the child's head and extremities as well as encouraging antigravity flexion and postural alignment.

General Considerations: Usually used with children who have mild involvement. Some wedges have straps to prevent the child from leaning over or rolling off.

Adaptations: A small roll (towel or otherwise) may be placed under the knees to aid in bending legs. Lateral trunk supports can also be added. Some wedges have a foam block to put between the child's knees to relax stiff legs.

NESTS AND BEAN BAG CHAIRS

Function: Children with more involvement may require more support in supine. "Nests" and bean bag chairs offer support all around the child. It also provides a feeling of security and comfort to children who may be less aware of where their bodies are in space. This piece of equipment offers neck and lower extremity flexion and upper extremity adduction (bringing the arms closer to the body), which aids in breaking up abnormal reflexes and tone. Nests and been bag chairs promote midline orientation of head and extremities.

General Considerations: Can be used with a wide range of children, from mild to severe involvement. Nests and bean bag chairs are good for children who have decreased body awareness or those children who need to have their arms and legs brought closer to their bodies.

Adaptations: Pillows can be wedged in around the child for added support. Nests can be fastened to boards or triwall for added firmness for weightbearing and postural alignment. Straps can be attached to keep pelvis in place.

SIDELYING

Positioning in Sidelying

Purpose: An alternative to supine, sidelying encourages muscles on both sides of a joint to work together. It encourages counter-rotation of the shoulder girdle and hips (movement in opposite directions increases spinal mobility) and lower extremity dissociation (separation of the legs). Weightbearing is also promoted in this position, which in turn promotes proximal stability in the shoulder girdle and hips and normal muscle tone. This is a position in which midline head control is easily facilitated. Reaching can also be encouraged in this position.

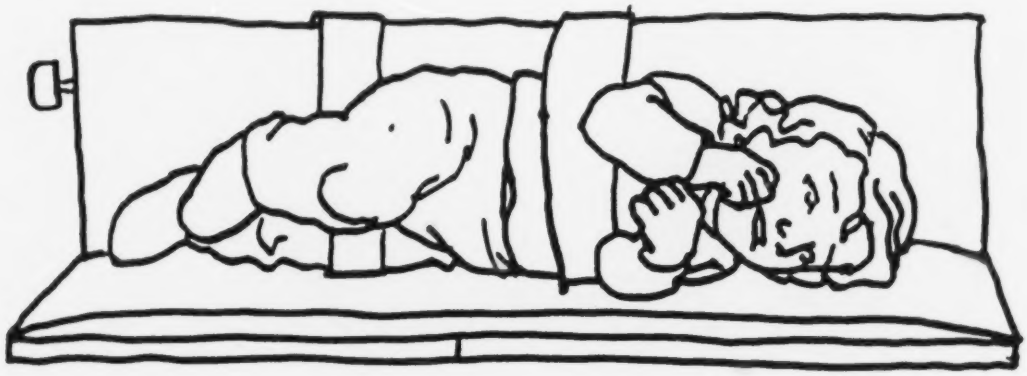
A sidelyer can also be added to a bed or crib to offer alternative positioning for those children who are unable to turn or roll over in bed. Children with less involvement can be positioned in sidelying by using pillows or towel rolls.

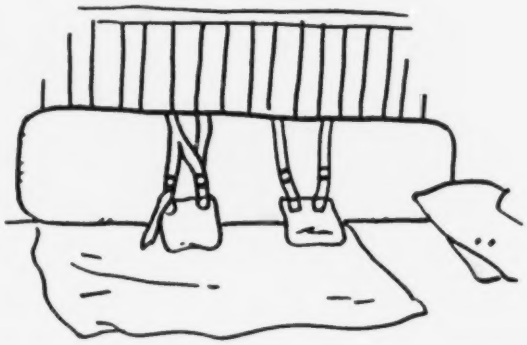
Goal: To provide a firm, stable surface to maintain a sidelying position. Head is in neutral alignment and trunk is supported with shoulder and hip counter-rotation. The hips and/or trunk are secured with straps and the legs are separated and abducted if necessary.

Summary: Sidelying is a good position to minimize the influence of abnormal reflexes, promote postural control and weightbearing as well as leg dissociation that is necessary for further motor development.

Options for Sidelying:

Sidelyers
Sidelying during transportation



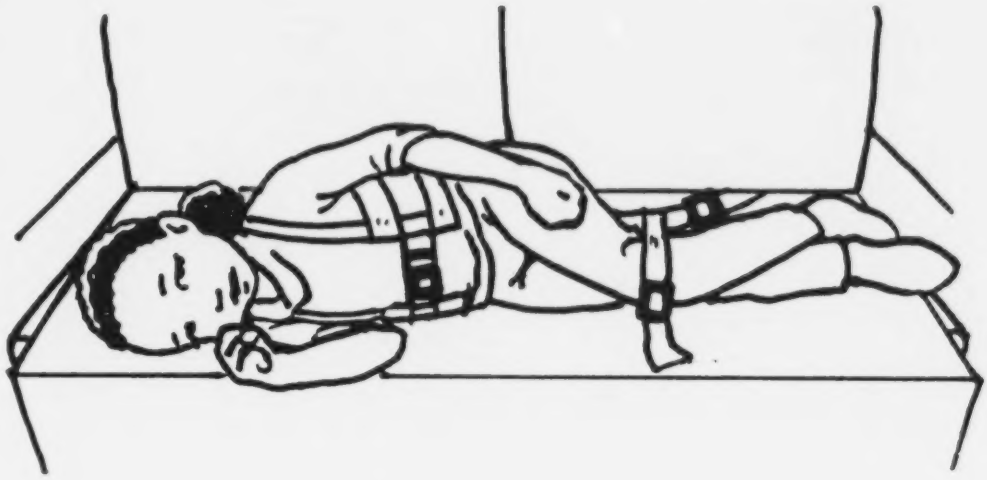


SIDELYERS

Function: For any child who is not able to maintain sidelying independently, where towel rolls or pillows are not providing enough support to maintain the position. Promotes neutral body alignment, midline head control, and hands to midline for play.

General Considerations: Used as an alternative position to supine and prone. Generally used for children with moderate to severe motor impairments.

Adaptations: A small pillow should be placed under the child's head to maintain alignment with the trunk. A chest strap is often needed to maintain trunk alignment and support anteriorly. A pillow between the child's legs assists in keeping the upper leg neutrally aligned and also helps dissociate the legs. The upper arm should be placed forward to allow for reaching and exploration of the environment.



SIDELYING DURING TRANSPORTATION

Function: A strap and vest system that provides an alternate position to seating for larger children, especially when riding in a vehicle for long periods of time. Promotes neutral body alignment, midline head control, and hands to midline for play.

General Considerations: Used as an alternative position to sitting in a car seat. Child must meet weight and size requirements. Generally used for children with moderate to severe motor impairments.

Adaptations: A small pillow should be placed under the child's head to maintain alignment with the trunk. A pillow between the child's legs assists in keeping the upper leg neutrally aligned and also helps dissociate the legs.

SEATING

Seating

A child should begin to develop the muscle control necessary for maintaining balance in sitting at 6 to 9 months of age. A child with muscle tone that is either too high or low will have difficulty maintaining an upright posture and often will use his/her arms for support. In order to free their hands for play, while promoting head and trunk control, support can be offered around the pelvis and trunk. The amount of support necessary will vary according to the child. In the following section we will discuss the various seating options available. The most appropriate seating for the child should be determined by the therapist/team.

Adaptive Seating in General:

Purpose: To provide as much support as necessary to control or minimize the influence of abnormal muscle tone or postural patterning; to prevent deformities while still allowing for movement and volitional control; to allow the child to develop more normalized tone; to allow for volitional use of upper extremities.

Goal: To provide a straight back and firm seat support, with a 90 degree angle at the hips (seat to back angle), a 90 degree angle at the knees, feet placed on a firm surface with ankles at a 90 degree angle (seat to back angle may differ for the child with strong extensor spasticity); to maintain head and trunk in midline with shoulders even, equal weightbearing through both hips, and knees and feet approximately shoulder width/hip width apart.

Summary: Promote symmetrical weight bearing so the child can use both hands for interaction and maintain head erect in midline for visual regard, feeding and communication.

Options for Seating:

- Towel Rolls,U-Shaped Pillows, Sandbags, and U-Seats
- Feeder Seat/Floor Sitter
- Corner Chairs
- Bolster Chairs
- Benches and Bolsters
- High Chairs and Toddler Chairs
- Swings
- Toilet Supports
- Bath Supports
- Car Seats

TOWEL ROLLS, PILLOWS, SANDBAGS, CRESCENT PILLOWS AND U-SEATS

Function: These pieces of equipment support the child at the hips to prevent the child from leaning too far in one direction and losing balance. U-Seats are made of a dense foam and are used with children who have fair balance but require support posteriorly and laterally. These children usually have enough trunk control to lean forward to play and return to an upright position independently.

General Considerations: Usually used with children who have fair to good sitting balance, but require extra support at their pelvis due to low tone.

Adaptations: Due to amount of stabilization needed at pelvis, may need to stack pillows or sandbags higher, or increase height of U-seat. (see How To section)

FEEDER SEATS / FLOOR SITTERS

Function: The feeder seat is constructed of a dense foam which is rounded at the hips to form a sitting position. It allows the low tone child to conform to the chair. The chair can then be placed on its base or in another chair or stroller and angled upright as needed or tolerated by the child to increase sitting ability.

General Considerations: May be recommended for children with either high or low tone who are unable to sit at 90 degree angle due to contractures or poor head and trunk control. The feeder seat may be helpful to get the child inclined enough to sit. Usually used when the caregiver is feeding the child; it allows for proper trunk, head and neck alignment and acts as stable base to help facilitate oral motor skills (suck/swallow, tongue, lip and jaw movements).

Adaptations: seatbelt, harness, head supports

HIGH CHAIRS and TODDLER CHAIRS

Function: Commercial highchairs can be adapted to use with some children. They allow the child to be at the height of the caregiver for eye contact, and allow the child to be brought up to the table to be a part of the family at mealtime. Adaptive chairs with trays can also be purchased for the child to eat and/or play in.

General Considerations: This seating is best recommended for the child who has fair to good sitting balance and muscle control, and who is able to maintain a sitting position with only minimal assistance. To promote self feeding, the tray must be at an appropriate height to allow functional arm movements.

Adaptations: Lateral hip and trunk supports/cushions, abductor, foam cut out seat (made commercially for baby's bath), seatbelt, support vest

TOILETING SUPPORTS

Function: Toilet supports allow the child stability when toileting. Equipment selection depends on the amount of support needed by the child; it may range from reducer ring, handrails, or step to a full upper body support with abductor, seatbelt and harness. Some children with special needs are able to use commercial toddler potty seats and toilet supports.

General Considerations: It is important to give the child as little support as is necessary, so that he or she may be as independent as possible in toileting skills (i.e. getting on and off the toilet, wiping, etc.). ****The bathroom is a dangerous place for children, and they should not be left alone while using toileting equipment.****

It is important to note that for success with bowel movements, the child must have stability not only through their pelvis, but also through their legs - the child's feet should be firmly planted on the floor, footrest, or a step. The child with adductor muscle tightness (male or female) will require an abductor on the toilet seat.

Adaptations: Lateral pelvic and trunk supports, abductor, head supports, seatbelt, harness, handrails, step, reducer ring

BATH SUPPORTS

Function: Bath supports offer firm support and safety to the child when bathing. Bath chairs enable the caregiver to have both hands free to wash the child. For the higher functioning child there is a wrap-around device to assist with trunk balance; this support also enables children to have their hands free for washing themselves and for water play.

General Considerations: There are different types of support, depending on the child's needs. Some bath supports allow the child to be immersed in the water, which gives the child valuable tactile input and the opportunity for water play. Bath chairs are available that sit up higher, to protect the caregiver with a bad back from having to lean so far over to place, wash, and then pick up the child.

*****The bath support is an aid for use in the bathroom, it does not take the place of adult supervision; children should never be left unattended in the bath.*****

Adaptations: Lateral pelvic and trunk supports, abductor, head supports, seatbelt, harness, chest strap

CAR SEATS

Function: The car seat offers support for transporting the child in a car, van, bus, etc. It also works to protect the child in case of an accident. The car seat usually comes with a seatbelt and harness system. Commercial carseats may be adapted, or adapted car seats are available which have been crash tested.

General Considerations: At times a car seat or other commercial carrier for a child can be adapted with rolls or foam to offer enough support for the child with very mild involvement - usually those with hypotonic musculature. ***** Great caution should be used in deciding whether or not to adapt a car seat, as it may change the effectiveness of the car seat if in an accident.*****

Adapted car seats purchased through an equipment vendor can accomodate a child up to 105 lbs. (standard carseats accomodate up to 40 lbs.). Some carseats have stroller bases available. Some seating systems for wheelchairs are crash tested as a car seat up to certain weight limitations.

For the larger child, being transported in sidelying or supine is an option; see section on sidelying.

Adaptations: Lateral pelvic and trunk supports, abductor, head supports

SWINGS

Function: The back and seat of the swing offer support to the child. The swing is often positioned on a slight recline, so that gravity assists the child to stay in the swing during movement. The swing can be adapted to fit the needs of the child for support and safety.

General Considerations: The swing allows a certain freedom of movement that the child with motor delays often does not get to experience with his or her own body's movement. It gives the child vestibular input with both back and forth movement and rotary (circular) movement.

The swing is recommended for all children, with the exception of those children who have seizures. For those children who do have seizures, rotary movements in the swing are discouraged.

Adaptations: Lateral hip and trunk supports, head supports, seatbelt and harness

CORNER CHAIRS

Function: The corner chair gets it's name from the shape of the back support; it is usually constructed of wood and the pieces fit together in the back in a "V" shape or a 3 section semi-"V" shape. The shape of the back offers lateral support for the head and trunk and promotes the shoulders to come forward, allowing the hands to come to midline for play.

General Considerations: Corner chairs provide support for a symmetrical posture and midline head and trunk orientation, which can encourage trunk control and will free hands for play.

Adaptation Options: A caster base is available so that the chair can be pushed from room to room. Other options include: tray, shoeholders, abductor wedge, seatbelt and harness.

BOLSTER CHAIRS

Function: The seat of the chair is shaped like a roll, and the back support is upright and firm. When the child is placed over this surface the roll acts to separate the child's legs at the hips while flexing the legs at the hips and knees. By keeping the legs separated and hips flexed with external rotation, children are provided a wider base of support at their pelvis to balance their trunks.

General Considerations: This chair is best recommended for the child who has increased tone or spasticity in inner thigh muscles or whose legs turn in or stay close together. The bolster chair offers a wide base of support with hips bent and legs apart to achieve the best pelvic and trunk alignment for the high toned child. A bolster chair is also recommended to decrease the "W" sitting position.

Adaptations: Lateral hip and trunk supports, firm back and foot supports, tray, seatbelt, chest support or harness.

BENCHES AND BOLSTERS

Function: Bolsters and benches can be used as an alternative to sitting in a traditional chair.

General Considerations: These devices do not offer support and therefore are only recommended with clients who have good sitting balance, and trunk and head control. They both offer a support surface for moving from sit to stand. The bolster provides the child who has increased tone or spasticity a wide base of support to help maintain the sitting posture by placing the hips in flexion with abduction. This also helps to decrease "W" sitting.

Adaptations: height of bolster or bench, angle adjustment

STANDING

Positioning in Standing

Purpose: Children with developmental disabilities very often are not able to stand on their own at an appropriate age. This adaptive equipment provides safe upright positioning for the child who lacks the balance or control to maintain this position without the aid of a support device. Upright positions will allow for increased head control and freedom of movement of upper extremities. Upright positions also facilitate lower extremity weightbearing for circulation, bone growth and joint stability. This equipment also provides an alternative to seating while maintaining postural control.

Goal: To provide a supportive surface for weightbearing that promotes optimal trunk, pelvic, and lower extremity alignment. For the most benefit, children should be standing as upright as possible. The trunk and pelvis should be symmetrical, and hips, knees, and ankles should be in a straight line with toes pointing forward, and head should be erect.

For all standers, children should use the equipment only as long as they are actively using their muscles to stand. If the child's head and arms droop or legs start collapsing, take the child out of the equipment; it is no longer doing any good.

Summary: The benefits of standing are as follows:

1. Promotes bone growth.
2. Promotes joint stability.
3. Promotes normal bowel and bladder function.
4. Stretches muscles to help prevent joint deformities.
5. Allows social interaction with peers.
6. Promotes body awareness upright.

Supported standing provides for these benefits while allowing upper extremities to be free for exploration of the environment, educational tasks or play.

Options for Standing:

Supine Standers
Prone Standers
Vertical Standers
Box Standers

** some pieces of equipment provide vertical,prone and supine options

SUPINE STANDERS

Function: These are adjustable pieces of equipment for children who have more specific positioning needs. The amount of weightbearing through the legs can be varied dependent upon the child's tolerance. The supine stander is recommended in those cases when you want to inhibit excessive extension patterning. (see triwall How To section)

General Considerations: For children who have moderate to severe involvement. Trays or tables are often used in conjunction with standers to provide a weightbearing surface for the child's arms to facilitate head and trunk control. They also provide a surface for educational tasks or toys.

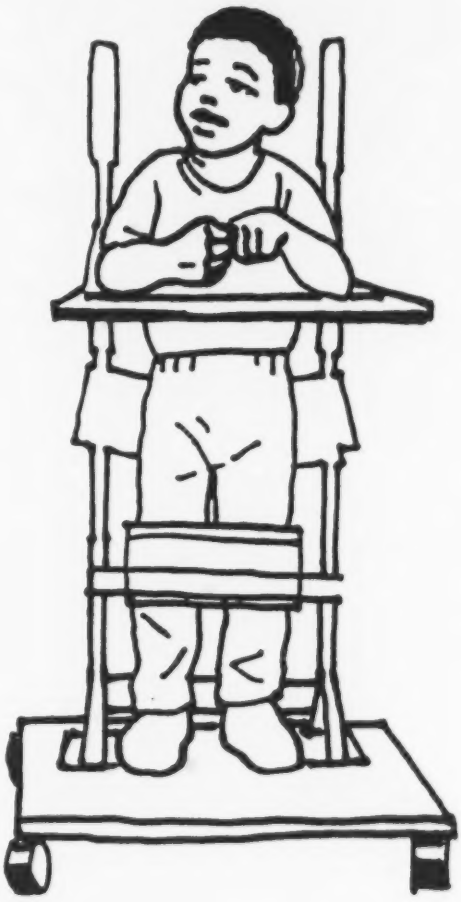
Adaptations: trunk supports, head supports, pelvic belts, hip and knee guides, and abductor pillows

PRONE STANDERS

Function: This is an adjustable stander, which is sometimes more appropriate than a supine stander for those children whose muscle tone/posture is dominated by flexor tone.

General Considerations: For children with moderate to severe involvement. Often used with children who have knee flexion contractures.

Adaptations: Chin rests to assist in head support if necessary, trays for weightbearing through arms, padded surface for weightbearing through knees, trunk and pelvic belts, and abductors



VERTICAL STANDERS

Function: This is one of the least restrictive upright standers. Support is given at the pelvis and knees if necessary. The child does not have to balance in standing and is free to use arms and hands to perform activities such as: painting at an easel, playing ball, feeding him/herself, etc.

General Considerations: For children with mild involvement who have fair postural control and alignment.

Adaptations: Straps can be adjusted to offer more or less support as needed.

BOX STANDERS

Function: This is another stander that is not very restrictive. It offers a safe opportunity for standing in that it surrounds the child on four sides. It allows for both standing and weightshifting.

General Considerations: For children with minimal involvement who have fair to good trunk and pelvic stability but need to work on balance and weightshifting.

Adaptations: Support can be added at pelvis and knees if necessary.

MOBILITY

Positioning for Seated Mobility

Purpose: A mode of mobility for children which provides as much support in sitting as necessary to control or minimize the influence of abnormal muscle tone or postural patterning. Proper positioning to prevent bone deformities while still allowing for movement and volitional control of the upper extremities so that children may move themselves through their environment and/or use their hands for functional activities. Seated mobility is recommended for children who are non-ambulatory. Seated mobility is also recommended for use in the community for children who are able to walk, but whose endurance is not high enough for long distances.

Goal: To provide appropriate support for children while in sitting positions (see seating section for these principles) so that they can have the highest level of independent mobility within their environment.

Summary: A mode of mobility that promotes symmetrical weight bearing so children can use their hands for moving themselves around in their environment. Proper alignment in sitting also facilitates the child's head erect in midline for visual regard and frees hands for play.

Options for Seated Mobility:

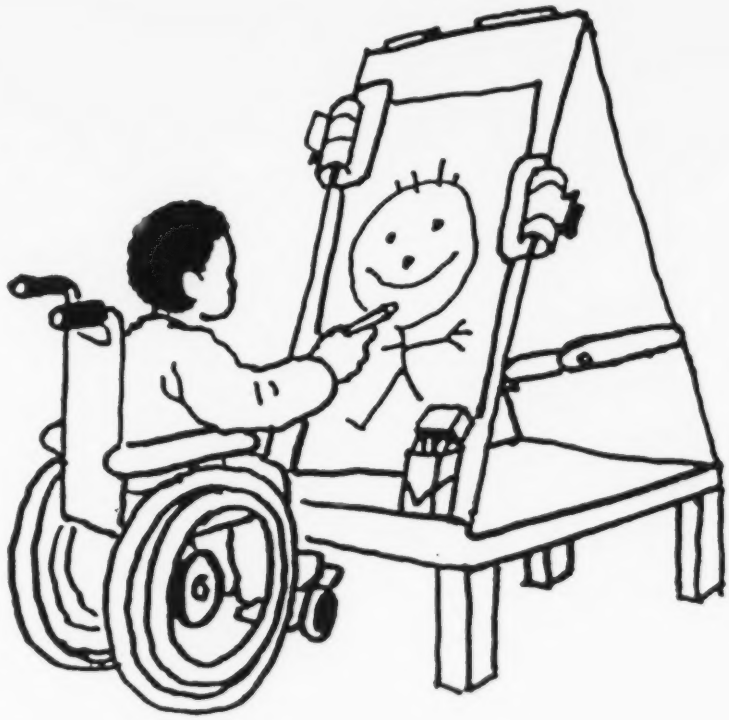
Strollers
Manual Wheelchairs
Power Wheelchairs
Self-Push Carts

STROLLERS

Function: A stroller is a means of transporting younger children who cannot push a wheelchair themselves.

General Considerations: An adaptive stroller not only needs to provide the most optimal seating position for symmetrical weightbearing through the pelvis and legs, but also must allow for freedom of mobility within the child's environment. The level of support within the seating system of the stroller varies on the needs of the child. For the child with mild involvement, commercially made strollers can be used with the addition of cushions or an insert (see triwall How To section). For the child with moderate to severe involvement, adaptive strollers with custom seating systems can be purchased which will provide optimal positioning for the child.

Adaptations: inserts, handle extensions, seatbelts, harnesses, trunk supports, head supports, foot supports, abductor /adductor wedges, armrests, blocks, trays and brakes

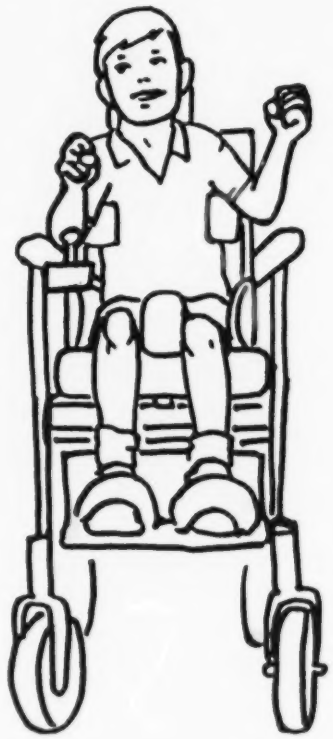


MANUAL WHEELCHAIRS

Function: A manual wheelchair has two smaller wheels in the front that swivel to aid in turning the chair, and two larger wheels in the rear used to propel the chair forward or backward. The manual wheelchair allows independent mobility for those children who can self propel within their environments. The manual wheelchair can also be easily pushed by the caregiver.

General Considerations: Standard wheelchairs typically come with a sling seat and back which are made of upholstery. The upholstered seating is not recommended for optimal positioning as it often encourages abnormal postures and movements. It should be replaced with a custom seating system or adapted to provide a firm surface and support appropriate to obtain optimal positioning for the child. A consultation with the family, therapists and equipment vendor should take place in order to evaluate possible customizing of the chair. How the chair will be transported and in what environments/terrains it will be used need to be taken into consideration.

Adaptations: tilt-in-space, one-arm drive, reclined seat seatbelts, harnesses, trunk supports, headrests, foot supports, armrests, abductor /adductor wedges, brake extensions, armrests, blocks, trays, and brakes



POWER WHEELCHAIRS

Function: Power wheelchairs are operated by computer chips and run by batteries. This type of chair allows independent mobility for the child. The user most commonly drives using a joystick control. For those children who cannot use a joystick, other methods are available to steer the wheelchair: sip and puff, tongue pad, head switches, etc.

General Considerations: A power wheelchair may be indicated for children who are not able to propel a manual chair due to difficulty with controlling arm movements, or for children who will fatigue quickly when pushing their own chairs. High levels of visual perception, motor planning, and safety awareness are required. The child's family, therapists and physician should be involved when deciding if the child is an appropriate candidate for powered mobility.

As mentioned with manual wheelchairs, a custom seating system needs to be considered. How the chair will be transported and in what environments/terrains it will be used need to be taken into consideration.

Adaptations: seatbelts, harnesses, trunk supports, headrests, foot supports, armrests, abductor /adductor wedges, brake extensions, armrests, blocks, trays and brakes

SELF-PUSH CARTS

Function: There are several types of carts on the market in which the child sits low to the ground and is able to independently move by pushing the wheels. This type of mobility system allows for toddlers to be eye level with peers during floor play. These carts can be hand-made (see "How To" section).

General Considerations: For the child with minimal to moderate involvement, fairly good trunk control, and the motor ability to push the wheels independently. Self-push carts are low to the ground, allowing the child to crawl on and off it independently.

Adaptations: seatbelt, harness

Mobility: Ambulation

There are various adaptive devices used to aid children in walking. They are chosen by the physician and/or physical therapist dependent upon the amount of assistance the child needs. Ambulation aides include: walkers (forward and posterior), crutches, canes, and push toys (for those children who do not need significant support to walk, usually for beginners).

Purpose: Ambulation is an important means of independent mobility. Many children with motor delays also experience delays in independent mobility. This is often due to poor postural control and poor balance. Adaptive equipment for ambulation is used to provide the child with the assistance they need to walk while allowing the least restrictive position for the child.

Goal: Adaptive equipment for ambulation is used to provide children with their most independent walking and most energy efficient means of mobility. It is used to assist children with balance by increasing their base of support.

Summary: Ambulation aids need to be considered carefully and monitored closely to ensure that the equipment continues to meet the child's needs. Many children need a greater amount of support when first beginning to walk and then less support is needed as children spend time in ambulation and gain greater control. The child's upper extremity abilities (strength and muscle control) and his/her ability to balance in standing need to be considered when choosing the right piece of equipment, as crutches provide less support and require more control on the child's part than walkers.

Options for Ambulation:

Push Toys
Walkers
Crutches

PUSH TOYS

Function: Push toys are indicated for children with very mild balance impairment or for the child who is "graduating" from crutches towards independent ambulation. The toy handle places the child's upper extremities in a position that facilitates trunk extension while providing assistance for slight loss of balance in a lateral direction.

General Considerations: These toys provide the least amount of support and require that the child be close to independence in walking, as the child is also required to control the speed of the toy. The toy handle needs to be about midwaist to chest level high to provide proper support while facilitating good alignment.

Adaptations: Height adjustable handle, weighted option for increased resistance during pushing.

WALKERS

Function: Walkers provide an increased base of support for the child who is able to support his weight independently but needs assistance to balance in all directions. The placement of height and type of walker should also be facilitory for good postural control.

General Considerations: Front and posterior walker indications need to be considered with the child's therapist. A walker is sometimes used for the child with low motor control as he/she begins to walk and is helpful for the child to gain balance.

Adaptations: Adjustable height, platform adaptations with dowels for the child with greater upper extremity involvement, wheels, wheels with backward brakes, without wheels depending on amount of control required from walker.

CRUTCHES

Function: Crutches are indicated to help the child walk who has greater upper trunk and upper extremity control. They increase the child's base of support, which makes him or her more stable in standing and walking. Crutches require a greater ability for independent balance by the child.

General Considerations: The type of crutch and crutch training are imperative to be performed by the therapist. Crutches provide the child with a greater independence in walking and greater freedom in the community (i.e., step negotiation, sit to stand).

Adaptations: Adjustable height, various handle designs for various upper extremity involvement, axillary versus Lofstrand/forearm crutches.

Selecting and Purchasing Equipment

Selecting Equipment/Manufacturer

Once the child's team has completed their functional needs assessment and has decided upon the desired type of equipment, the task still remains to decide which manufacturer produces the equipment which best meets the child's positioning needs. Equipment options need to be considered as most pieces of positioning equipment come with various options or accessories to allow optimal positioning when in that particular piece of equipment. These options will also assist the child in reaching the goals desired for that position or during mobility. The therapists and equipment vendor are necessary in this part of the decision.

There may be many companies which manufacture the same piece of positioning or mobility equipment desired. Your equipment vendor can be very helpful in recommending from which company to order. Consider warranties offered, time frame for delivery of ordered equipment, average time for repairs or replacement of broken parts, and options offered for that equipment.

Size Selection

The size of the particular piece of equipment will need to be considered to ensure appropriate fit for the child's present size while allowing for future growth. The equipment vendor will measure the child and make recommendations in conjunction with the therapist regarding the appropriate size of equipment to be ordered.

Justification of Need

In order to procure funds for the desired piece of equipment, the therapists will write an equipment justification which should, above all, describe how the equipment is *medically necessary* for the child. This should include a brief description of the child's motor abilities and limitations, and specifically how this piece of equipment will assist in alleviating some of those motor limitations. The justification should directly address any options requested and describe specific needs for the options as related to the child. It should also briefly describe some initial goals that the team plans to achieve while using this equipment and the long term carryover anticipated from the equipment, i.e., effects of the equipment when the child is not directly using it. In most cases, it will also be necessary to receive a written prescription from the child's physician. This can be on the physician's prescription pad or he can co-sign the equipment justification.

Once all options, equipment size and manufacturer are decided upon, the equipment vendor will send a written price quote to accompany the justification and physician's prescription to the funding source.

Funding Options

There are several options for funding which may be explored. If the child has private insurances, submit the equipment request to the insurance company. If only a portion of the equipment is approved or if the request is denied, other options remain. Public funding is available through most states. In North Carolina, Medicaid and CAP-MR/DD are two funding sources. Children's Special Health Services (CSHS) is a state program which funds equipment for children ages birth to 21. The child must be financially eligible and have a condition that is covered by the program. The equipment must be medically necessary. The equipment justification, price quote and physician's prescription must be submitted to CSHS for review and approval.

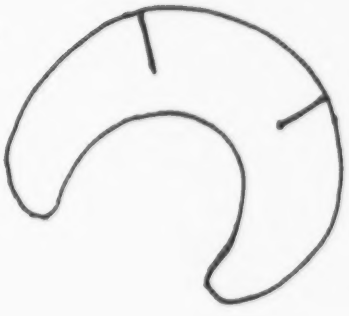
North Carolina also has special funds for assistive technology for children birth to 3 years of age who qualify for early intervention services under PL99-457/IDEA. There is no financial eligibility. However, funds are available only when other sources of payment (insurance, CSHS, Medicaid, CAP-MR/DD) are not available or cover only a portion of the cost. The requested piece of equipment and child's needs, must be reviewed by the local Birth to Three Consortium and included in the child's IFSP (Individualized Family Service Plan). The request must be submitted before the child's third birthday. Equipment vendors and therapists can help direct requests for public funding.

If above funding sources are unavailable to the child, private resources can be used. These vary depending on the region of the state. Many church organizations, civic clubs and other private foundations have grants available, or are willing to assist in fund drives to assist children in obtaining a needed piece of equipment. The equipment vendor and therapists are usually aware of which organizations are available in the area and how to submit information and requests to them.

"How-To"

IDEAS

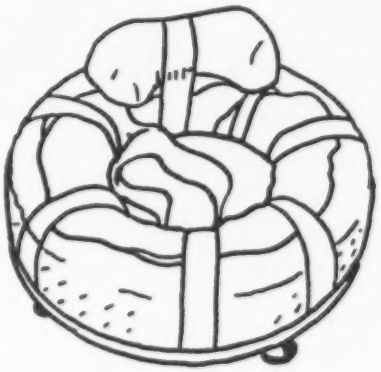
CRESCENT PILLOWS



Materials:
- 1-1 1/2 yards of fabric
- thread and needle
- pins
- sewing machine
- foam shavings or polyfill (can be purchased at fabric store)

Directions:
- cut out material in crescent shape (two pieces), with inside of crescent slightly smaller diameter (to leave a sewing margin) as around your child's hips
- sew in two 4-5" long darts on each piece of material
- place right side of the pieces of material together, pin, and sew around the entire shape, leaving only 5" area unsewn
- turn material right side out
- stuff with foam shavings or polyfill
- whip stitch 5" opening shut

NESTS



Materials:
- inner tube or old tire
- material to cover the tire (i.e., blankets, towels, or padded fabric)
- webbing or canvas for straps
- velcro for straps
- one piece of plywood wide enough to place the inner tube or tire on
- four casters
- screws, washers, screwdriver

Instructions:
- attach the casters to the underside of the plywood
- place the inner tube or tire on the plywood and secure to plywood using strapping material (attach with screws and washers)
- secure two pieces of strapping, with velcro already attached, to base to act as seatbelt
- cut the material larger than the outer diameter of the inner tube or tire - make slits in for seatbelt straps to go through
- tuck in material under the tire/inner tube, leaving some slack in the middle for the child to be placed in

USING CONSTRUCTA FOAM

Constructa Foam is a very dense foam that is often powder blue in color. It comes in different sized blocks. It is very versatile in that is can be cut into any shape that is desired or can be pieced together. It provides a firm surface for weightbearing and can be used to make headrests, blocks, wedges, abductor pads, adductor pads, or to fill in areas to provide a contact surface for weightbearing. Adaptations can easily be made to allow for growth or changes in orthopedic status.

Constructa foam is an expensive material. Recommendations for specific use should come from a therapist along with specific measurements for adaptive equipment. Constructa Foam can be "dipped" to make it water resistant or covered in vinyl or other materials.

SUPINE STANDERS

Materials:
- plywood measuring 6" to 12" longer and wider than the child's measurements
- any type of fabric for straps
- velcro or buckles to attach to straps
- two angle iron hinges to attach the foot plate
- hammer
- nails
- glue
- foam blocks

Instructions:
- Cut the plywood 6" to 12" longer and wider than the child's measurements. This will serve as the board on which the child will lie against.
- Cut another piece of plywood that is the same width of the previous cut board and the length of the child's foot. This second board will serve as the footplate.
- Attach the foot plate to the main board by screwing on an angle iron hinge to each side allowing the footplate to fold upwards for storage.
- Shoe holders or foot guides may be added to the footplate to support the feet in a better position.
- Cut two to three straps out of the fabric and/or webbing long enough to wrap around the stander and the child's body at the chest and knees.
- Attach a buckle and/or velcro to the fabric in order to fasten the fabric around the stander and child for support, safety and alignment purposes.
- The foam blocks may be used as head supports, trunk supports or an abductor to assist with positioning for proper alignment once the child has been placed in the stander.

*** A triwall insert may be needed to maximize body alignment. See the reference section for more information on triwall.

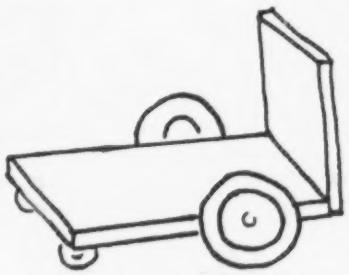
PRONE STANDERS

Materials:
- plywood cut in length from the child's midchest to the undersurface of their feet.
- two angle iron hinges
- hammer, nails, glue
- any type of fabric for straps
- velcro or buckles to attach to straps
- foam blocks

Instructions:
- Cut plywood that measures from the child's midchest to the undersurface of their feet.
- Then cut another piece of plywood that is the same width of the previous cut board and the length of the child's foot. This second board will serve as the footplate.
- Attach the foot plate to the main board by screwing on an angle iron hinge to each side, allowing the footplate to fold upwards for storage.
- Shoe holders or foot guides may be added to the footplate to support the feet in a better position.
- Cut two to three straps out of the fabric and/or webbing long enough to wrap around the stander and the child's body at the chest and knees.
- Attach a buckle and/or velcro to the fabric in order to fasten the fabric around the stander and child for support, safety and alignment purposes.
- The foam blocks may be used to assist with positioning for proper alignment (at head, trunk, between knees, etc.) once the child has been placed in the stander.

*** A triwall insert may be needed to maximize body alignment. See the reference section for more information on triwall.

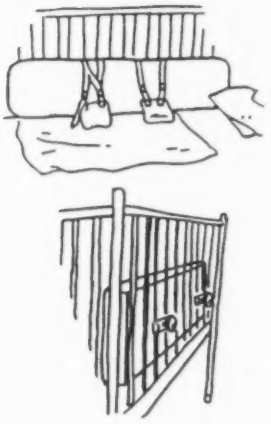
SELF-PUSH CARTS



Materials:
- plywood
- 2 casters
- 10-12" diameter wheels (lawnmower)
- 6" L brackets
- 3" L brackets
- any webbing for seatbelt
- velcro or buckles to attach to straps
- nails, hammer
- screws, screwdriver
- 2 bolts and nuts, washers

Instructions:
- Cut two pieces of plywood. The width of both should be the width of the child plus six inches. The length of one should be the length of child from bottom of feet to back while in long sitting (seat). Also when in long sitting, measure the child from shoulder level to floor; this is the length of the second piece (back).
- Attach casters to the base, up near the front.
- Attach 3" L brackets to the underside of the base, with bracket pointing down.
- Use bolts,washers and nuts to attach large wheels.
- Use large L brackets and nails to attach back.
- If seat belt or chest strap is needed, attach velcro and then fasten to the cart.

SIDELYERS

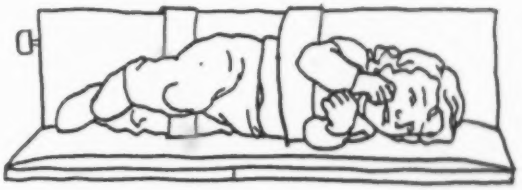


Sidelyer To Attach To A Crib Rail

Materials:
- plywood
- fabric to cover the inside of the sidelyer
- drill
- screws and bolts
- any type of fabric for straps
- velcro or buckles to attach to straps
- foam

Instructions:
- Cut the plywood the length of the child plus an extra foot for growth and no more than 2 to 4" wider than the child's hips and chest.
- Drill 2 holes through the wood and place screws in before attaching the foam (have the screw/bolt side opposite the side with the fabric).
- Cover the plywood with foam and fabric on the side that will come in contact with the child
- The sidelyer is then attached to the crib by placing the screw side against the rails and using boards to extend across two or more rails and tightening into place.
- Two straps are cut to reach around the sidelyer and child to support the chest and knees and to maintain an appropriate position. The straps can be fastened by velcro or buckles for a secure fit.

Free Standing Sidelyer



Materials:
- plywood
- fabric to cover the inside of the sidelyer
- drill
- screws and bolts
- any type of fabric for straps
- velcro or buckles to attach to straps
- foam

Instructions:
- Cut <u>two</u> pieces of plywood the length of the child plus an extra foot for growth, and no more than 2 to 4" wider than the child's hips and chest.
- Attach the two boards together at a 90 degree angle, leaving a small space between support surface and back surface to pass straps through.
- Cover the plywood with foam and fabric on the side that will come in contact with the child
- Two straps are cut to reach around the sidelyer. The straps can be fastened by velcro or buckles for a secure fit. Use the straps to maintain contact of the hips and back against the back surface of the sidelyer.
- Foam pillows may be needed under the child's head and under non-supported extremities (top arm and leg).

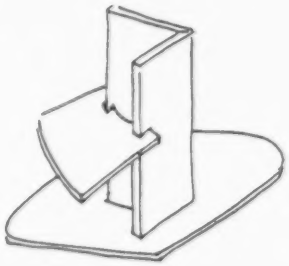
USING TRI-WALL

Tri-Wall, or triple wall, corrugated fiberboard, is often used instead of wood to fabricate adaptive equipment for your children. It is a lightweight, durable and inexpensive material. A complete piece of equipment can be constructed, or an "insert" can be fabricated for a piece of commercial equipment to offer the child more support. Most commonly, triwall is used to make the following pieces of equipment: Stroller inserts, high chair or toddler chair inserts, inserts for homemade standers, supine lyers, corner chairs, and tray tables.

It would be impossible to give all the details of constructing tri-wall equipment in the framework of this booklet, but an excellent resource is: "Tri-Wall Pattern Portfolio" written by TheraDesigns, Inc. and published by Therapy Skill Builders (602-323-7500). Call your local box companies to see if they manufacture triwall; if you explain what you are using it for, they may give you a discount or give you their "fall off" (the extra pieces when they cut out the form for the boxes they produce).

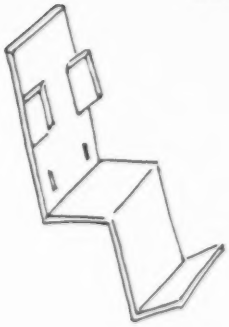
Materials:

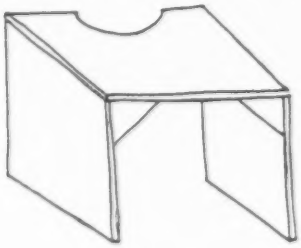
- hand held jigsaw or razor to cut triwall
- wood glue
- ruler
- 3" dowel pieces, one end sharpened
- awl
- hammer or mallet
- pencil



Instructions:

- Trace out pattern of equipment piece onto tri-wall. Your therapist may need to help you with measurements to ensure that it will fit and be therapeutic for your child.
- Cut out triwall using hand held jigsaw or utility knife/razor.
- Angles are made by cutting "V"-shaped cut into first two layers of the tri-wall. Wood glue is then applied generously, and tri-wall folded so that sides of V cut are contacting each other. Masking tape is used to maintain angle until glue is dried, then removed.
- Pieces of triwall are attached using wood glue and dowel "nails". Tri-wall pieces are glued together. A hole started with an awl, and glue is placed into the holes. Hammer the dowel until the end is flush with the surface of the tri-wall.
- Once the piece is fully constructed and glue has dried, it can be covered with contact paper. This not only improves the appearance of the equipment but also protects it from spills and makes the surface easy to clean.





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RESOURCES

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Greensboro, NC 27405
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fax (910) 621-1922

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Irons Building, Charles Blvd.
Greenville, NC 27858
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fax (919) 328-4486

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fax (919) 251-2652

Other Assistive Technology Programs in N.C.

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(919) 781-4434

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University of North Carolina
Chapel Hill, NC 27599-7255
(919) 966-5171

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Family Support Network
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N.C. Assistive Technology Project (NCATP)

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(919) 850-2787 (voice/TDD)

Harriet Forbis (North Central Region)
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